

Appl. No. 10/676,959
Amdt. Dated April 18, 2007
Reply to Office Action of January 18, 2007

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Amendments to the Claims:

This listing of claims will replace all prior versions, and listings, of claims in the application:

Listing of Claims:

1. (currently amended) A method comprising:
applying a flux on a substrate having solder bumps, the flux including at least a solvent and a water soluble monomer or a water soluble polymer having a melting point below 183°C if the solder bumps are eutectic or below 200°C if the solder bumps are lead-free;
placing a die on the substrate; and
reflowing the die in a reflow device at a reflow temperature, the reflow temperature having a temperature profile including an increasing region, ~~an approximately constant region~~, and a decreasing region, the increasing region including temperature higher than the melting point of the polymer and forming polymer liquid, ~~the approximately constant region forming solder joints~~, the decreasing region solidifying the solder joints and the polymer liquid to redistribute stress caused by thermal mismatch between the die and the substrate.
2. (original) The method of claim 1 wherein applying the flux comprises:
applying the flux including the water soluble polymer being one of a polyacrylic acid, a polyacrylamide, a polyvinyl alcohol, a starch, and a cellulose.
3. (original) The method of claim 1 wherein applying the flux comprises:
applying the flux including at least an organic solvent and the water soluble monomer.
4. (original) The method of claim 1 wherein applying the flux comprises:
applying the flux including at least an organic solvent and the water soluble polymer.
5. (previously presented) The method of claim 1 wherein reflowing the die comprises:
vaporizing the solvent at an increasing reflow temperature;
melting the polymer into the polymer liquid; and

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removing metal oxide from the solder bumps.

6. (previously presented) The method of claim 5 wherein reflowing the die further comprises:

melting the solder bumps;
forming the solder joints from the melted solder bumps;
solidifying the solder joints at a decreasing reflow temperature; and
solidifying the polymer liquid to redistribute the stress.

7. (original) The method of claim 1 wherein reflowing the die comprises:

vaporizing the solvent at an increasing reflow temperature;
reacting the monomer to form solid polymer;
melting the solid polymer into polymer liquid; and
removing metal oxide from the solder bumps.

8. (previously presented) The method of claim 7 wherein reflowing the die further comprises:

melting the solder bumps;
forming solder joints from the melted solder bumps;
solidifying the solder joints at a decreasing reflow temperature; and
solidifying the polymer liquid.

9. (previously presented) The method of claim 1 further comprising:

de-fluxing the die to remove polymer residue; and
dispensing an underfill material into a gap between the die and the substrate.

10. (original) The method of claim 9 wherein de-fluxing comprises:
dissolving the polymer residue by hot water.

11-30. (canceled)